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## **GEOLOGIC INVESTIGATIONS SPURRED BY ANALOG TESTING AT THE 7504 CONE-SP MOUNTAIN AREA OF THE SAN FRANCISCO VOLCANIC FIELD**

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### **Abstract Text:**

The SP Mountain area of the San Francisco Volcanic Field, AZ, has been used as an analog mission development site for NASA since 1998. This area consists of basaltic cinder cones, lava flows and maar craters that have been active since mid-Miocene, with the youngest events occurring within the last 10,000 years. The area has been used because its geologic and topographic resemblance to lunar and Martian terrains provides an ideal venue for testing hardware and science operations practices that might be employed on planetary surfaces, as well as training astronauts in field geology. Analog operations have often led to insights that spurred new scientific investigations. Most recently, an investigation of the 7504 cone was initiated due to perceptions that Apollo-style traverse plans executed during the Desert RATS 2010 mission had characterized the area incorrectly, leading to concerns that the Apollo traverse planning process was scientifically flawed. This investigation revealed a complex history of fissure eruptions of lava and cinders, cinder cone development, a cone-fill-and-spill episode, extensive rheomorphic lava flow initiation and emplacement, and cone sector collapse that led to a final lava flow. This history was not discernible on pre-RATS mission photogeology, although independent analysis of RATS 2010 data and samples developed a “75% complete solution” that validated the pre-RATS mission planning and Apollo traverse planning and execution. The study also pointed out that the development of scientific knowledge with time in a given field area is not linear, but may follow a functional form that rises steeply in the early period of an investigation but flattens out in the later period, asymptotically approaching a theoretical “complete knowledge” point that probably cannot be achieved. This implies that future human missions must be prepared to shift geographic areas of investigation regularly if significant science returns are to be forthcoming.

**Topic Selection:** Earth analogues as case studies for Martian geological materials and processes

**Title:** GEOLOGIC INVESTIGATIONS SPURRED BY ANALOG TESTING AT THE 7504 CONE-SP MOUNTAIN AREA OF THE SAN FRANCISCO VOLCANIC FIELD

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**Preferred Presentation Format:** Assigned by Program Committee (Oral or Poster)

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